REMARKS

Applicants have amended Claims 3 and 10 to make the claim language consistent with the language used in Claim 1.

Summary of the Invention:

The present invention relates to a hydrophobic polyurethane elastomer comprising the reaction product of: a) an isocyanate terminated prepolymer having an isocyanate content ranging from 4 to 12 wt.% NCO comprising the reaction product of i) an OH terminated homopolymer of butadiene and ii) an aliphatic or cycloaliphatic diisocyanate; and b) a diol chain extender. The elastomer of the present invention exhibits excellent mechanical properties.

Rejection of Claims 1-11 under 35 U.S.C. § 112, first paragraph:

The Patent Office rejected Claims 1-11 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The Patent Office believes that Applicants have failed to specify the type of molecular weight for the homopolymer of butadiene or how it has been determined. This rejection is respectfully traversed.

Applicants respectfully submit that one of ordinary skill in the art of polyurethane chemistry would readily appreciate that the molecular weight of Applicants' claimed polyol is determined from the hydroxyl group number. The hydroxyl group number is determined by a well established, standard ASTM test method. Support for Applicants' submission is found in the Encyclopedia of Polymer Science and Technology, Vol. 6, pages 164 and 165 (1997). A copy of these pages is attached as Exhibit A. Additional support for Applicants' position is found in United States Patent No. 5,589,543 ("Yokelson et al."), which was cited in the Application by the Patent Office. Yokelson et al. claim an elastomer comprising a polyol having a weight which is from about 0.5 wt. % to about 99.5% of the resulting elastomer. *See* Yokelson et al., column 3, lines 44-46. Yokelson et al., however, do not specify the particular method used to determine this molecular weight.

Applicants believe Claims 1-11 contain subject matter which was described in the specification in such a way as to enable one skilled in the art to make and/or use the invention. Applicants therefore respectfully request that the Patent Office withdraw its rejection of Claims 1-11 under 35 U.S.C. § 112, first paragraph.

Rejection of Claims 3 and 10 under 35 U.S.C. § 112, second paragraph:

The Patent Office rejected Claims 3 and 10 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as their invention. The Patent Office believes that, within Claim 3, the language "said dihydroxyl terminated polybutadiene", lacks antecedent basis from Claim 1. Additionally, the Patent Office believes that, within Claim 10, the language "said hydroxyl terminated butadiene" lacks antecedent basis from Claim 1. This rejection is respectfully traversed.

Applicants have amended Claims 3 and 10 to make the claim language consistent with the language used in Claim 1. Applicants believe Claims 3 and 10, as amended herein, are definite and particularly point out and distinctly claim the subject matter which Applicants regard as their invention. Applicants therefore respectfully request that the Patent Office withdraw its rejection of Claims 3 and 10 under 35 U.S.C. § 112, second paragraph.

Provisional rejection of Claims 1-11 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 12, 13, 16 and 18 of the '166 patent:

The Patent Office provisionally rejected Claims 1-11 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 12, 13, 16 and 18 of co-pending Application Serial No. 09/140,208, now United States Patent No. 6,166,166 ("the '166 patent"). The Patent Office believes that the claims are not patentably distinct from each other because each set of claims is drawn to a thermoplastic polyurethane derived from a polyisocyanate, an equivalent chain extender, and a hydroxyl terminated polybutadiene. Applicants note that the '166 patent only contains 17 claims in total. Thus, Applicants assume the Patent Office is provisionally rejecting its invention over Claims 12, 13, and 16-17 of the '166 patent. This rejection is respectfully traversed.

Although the '166 patent does teach in general what the Patent Office asserts it teaches, the provisional rejection under the judicially created doctrine of obviousness-type double patenting still fails because there is no concept in the '166 patent of teaching an elastomer with improved mechanical properties obtained simply by curing a casting composition of an elastomer, the elastomer comprising the reaction product of a prepolymer and a diol chain extender, the prepolymer comprising the reaction product of an OH terminated homopolymer of butadiene and an aliphatic or cycloaliphatic diisocyanate.

To the contrary, the '166 patent teaches a process for improving the mechanical properties of an elastomer obtained by not only curing but also extruding a casting composition of an elastomer, the process comprising: a) providing an elastomer comprising the reaction product of a prepolymer and a diol chain extender, the prepolymer comprising the reaction product of a hydroxyl-functionalized polybutadiene and an aromatic diisocyanate; b) chain extending the prepolymer with 1,4-butanediol to form a casting composition; c) extruding the casting composition to form at least one strand of a polyurethane elastomer; d) pelleting the at least one strand of polyurethane elastomer to form at least one pellet; and e) processing the at least one pellet to form a thermoplastic polyurethane material. *See* '166 patent, column 4, lines 10-15 and 64- 65; Table 3.

The reaction product of an OH terminated homopolymer of butadiene as claimed in Applicants' invention, and an aromatic diisocyanate, chain extended with 1,4-butanediol, and cured for eighteen hours yields a plaque which has poor mechanical properties (it is soft and cheesy). *See* Application, page 9, Comparative Example 6. On the other hand, the reaction product of an OH terminated homopolymer of butadiene as claimed in Applicants' invention, and an aliphatic or cycloaliphatic diisocyanate, chain extended with 1,4-butanediol, and cured for eighteen hours yields a plaque which has excellent mechanical properties. *See* Application, pages 7-8, Example 4.

Considering the foregoing, it is clear that Applicants' claims define a patentably distinct, non-obvious invention from that of the '166 patent. Hence, the

Patent Office's provisional rejection of Claims 1-11 under the judicially created doctrine of obviousness-type double patenting is improper. Applicants therefore respectfully request that the Patent Office withdraw its provisional obviousness-type double patenting rejection of Claims 1-11.

Provisional rejection of Claims 1-11 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1, 2 and 4-8 of the '659 Application

The Patent Office provisionally rejected Claims 1-11 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1, 2, and 4-8 of co-pending Application Serial No. 09/327,659 ("the '659 Application"). The Patent Office believes that the claims are not patentably distinct from each other because each set of claims is drawn to a thermoplastic polyurethane derived from a polyisocyanate, an equivalent chain extender, and a hydroxyl terminated polybutadiene. This rejection is respectfully traversed.

Although the '659 Application does teach in general what the Patent Office asserts it teaches, the provisional rejection under the judicially created doctrine of obviousness-type double patenting still fails because there is no concept in the '659 Application of teaching an elastomer with improved mechanical properties by providing an elastomer comprising the reaction product of a prepolymer and a diol chain extender which may be either asymmetric or symmetric. To the contrary, the '659 Application teaches an elastomer with improved mechanical properties by providing an elastomer comprising the reaction product of a prepolymer and an asymmetric diol chain extender. Asymmetric diol chain extenders are critical in the '659 Application for obtaining improved elastomer mechanical properties. *See* the '659 Application, Comparative Example 4.

The elastomer of the '659 Application comprises the reaction product of a prepolymer and an asymmetric diol chain extender such as 2,2,4-trimethylpentane-1,3-diol ("TMPD"). This reaction product yields a plaque with improved mechanical properties. *See* '659 Application, page 6, lines 13-15; Example 3; Table 1. However, an elastomer comprising the reaction product of the prepolymer of the '659 Application and a symmetric diol chain extender such as 1, 4-butandeiol yields

a plaque with poor mechanical properties. *See* '659 Application, page 7, Comparative Example 4.

On the other hand, the elastomer of Applicants' claimed invention comprising the reaction product of a prepolymer and an asymmetric diol chain extender such as TMPD or a symmetric diol chain extender such as 1,4-butandeiol yields a plaque with improved mechanical properties. *See* the Application, page 4, lines 8-27; Table 1, page 9.

Considering the foregoing, it is clear that Applicants' claims define a patentably distinct, non-obvious invention from than that of the '659 Application. Hence, the Patent Office's provisional rejection of Claims 1-11 under the judicially created doctrine of obviousness-type double patenting is improper. Applicants therefore respectfully request that the Patent Office withdraw its provisional obviousness-type double patenting rejection of Claims 1-11.

Rejection of Claims 1-11 under 35 U.S.C. § 102(b):

Claims 1-11 stand rejected as being anticipated by Yokelson et al. The Patent Office believes that Yokelson et al. disclose the production of hydrophobic polyurethanes derived from the reaction of difunctional polybutadienes having molecular weights which overlap Applicants' diols, with diisocyanates such as isophorone diisocyanate and dicyclohexylmethane diisocyanate, and diol chain extenders. This rejection is respectfully traversed.

To find anticipation of claims, the prior-art embodiments must possess the properties expressly recited in the claims. *See* E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co., 849 F.2d 1430, 7 U.S.P.Q.2d 1129 (Fed. Cir. 1988) Property limitations can serve to distinguish claimed subject matter. Id. Applicants' claimed invention is not anticipated by Yokelson et al. because the improved mechanical properties for the elastomer of Yokelson et al. are not obtained by providing a prepolymer comprising the reaction product of a diol and aliphatic or cycloaliphatic diisocyanates.

Yokelson et al. teach that the mechanical properties of an elastomer are improved by providing an elastomer comprising the reaction product of a prepolymer

and a chain extender, the prepolymer comprising the reaction product of a diol and an aromatic diisocyanate. *See* Yokelson et al., Tables 1-4. Yokelson et al. do not teach or suggest that the use of an aliphatic or cycloaliphatic diisocyanate would be more advantageous than the aromatic diisocyanate exemplified therein. Applicants have found, however, that mechanical properties of elastomers are improved by providing a prepolymer comprising a diol and an aliphatic or cycloaliphatic diisocyanate.

Applicants' claimed invention teaches that an elastomer comprising the reaction product of a prepolymer and a diol chain extender, the prepolymer comprising an OH terminated homopolymer of butadiene and an aliphatic or cycloaliphatic diisocyanate yields an elastomer with excellent physical properties. *See* the Application, pages 7-8, Example 4; page 9, Table 1. On the other hand, Applicants disclose that an elastomer comprising the reaction product of a prepolymer and a diol chain extender, the prepolymer comprising an OH terminated homopolymer of butadiene and an aromatic diisocyanate, yields an elastomer having poor physical properties. *See* the Application, page 9, Comparative Example 6.

The improved mechanical properties of the elastomer claimed in Yokelson et al. are obtained only by providing an elastomer comprising the reaction product of a prepolymer and chain extender, the prepolymer comprising an aromatic diisocyanate. Hence, because the improved mechanical properties of Applicants' claimed elastomer are obtained by providing an elastomer comprising the reaction product of a prepolymer and chain extender, the prepolymer comprising an aliphatic or cycloaliphatic diisocyanate, Yokelson et al. cannot be said to anticipate Applicants' claimed invention. Applicants therefore respectfully request that the Patent Office withdraw its rejection of Claims 1-11 under 35 U.S.C. § 102(b) in view of Yokelson et al.

Rejection of Claims 1-11 under 35 U.S.C. § 103(a) in view of Yokelson et al:

Claims 1-11 stand rejected as being obvious in view of Yokelson et al. The Patent Office believes that Yokelson et al. disclose the production of hydrophobic polyurethanes derived from the reaction of difunctional polybutadienes having molecular weights which overlap Applicants' diols, with diisocyanates such as isophorone diisocyanate and dicyclohexylmethane diisocyanate, and diol chain extenders. The Patent Office also believes that one of ordinary skill in the art, seeking light stable polyurethanes, would have been motivated to utilize the disclosed (cyclo) aliphatic diisocyanates, since it has long been known that polyurethanes derived from nonaromatic diisocyanates possess superior light stability properties as compared to polymers derived from aromatic isocyanates. This rejection is respectfully traversed.

The consistent criterion for determining obviousness is whether the prior art would have suggested to one of ordinary skill in the art that a claimed process should be carried out and would have a reasonable likelihood of success, viewed in light of the prior art. University of California v. Synbiotics Corp., 29 U.S.P.Q.2d 1463, 1466 (Cal. 1993). Both the suggestion and the expectation of success must be founded in the prior art, not in Applicants' disclosure. Id.

Although one skilled in the art may be aware that nonaromatic diisocyanates possess superior light stability properties, one of ordinary skill in the art would not be aware, without the benefit of Applicants' disclosure, that a prepolymer comprising a nonaromatic diisocyanate would yield an elastomer which is not only light stable, but which also has excellent mechanical properties. Yokelson et al. teach that a prepolymer comprising an aromatic diisocyanate yields an elastomer with improved mechanical properties. However, no where in Yokelson et al. is there a suggestion that the use of a prepolymer comprising nonaromatic diisocyanates yields an elastomer with improved mechanical properties. Table 1, Example 4, which is found on page 9 of the Application, sets forth the improved mechanical properties obtained from Applicants' claimed elastomer.

Yokelson et al. freely admit that ". . . the **final physical properties** of the elastomers of the [this] invention may be **altered considerably** by altering the identity . . . of the species reacted." *See* Yokelson et al., column 3, lines 57-60 (*emphasis added)*. This statement clearly shows that Yokelson et al. acknowledge that altering even one of the reaction products of the elastomer, such as the diisocyanate, will considerably alter the final physical properties of the elastomer. Thus, one having ordinary skill in the art, after reading Yokelson et al., while recognizing that the final physical properties of elastomers may be altered by altering the identify of the species reacted, is only taught that mechanical properties of elastomers are improved with prepolymers comprising aromatic diisocyanates.

Applicants' invention cannot be viewed as obvious in light of Yokelson et al. since Yokelson et al. only teach or suggest the use of a prepolymer comprising aromatic diisocyanates to obtain an elastomer having improved mechanical properties, while at the same time admitting that mechanical properties of elastomers can be altered considerably by altering reaction products. In fact, Yokelson et al.'s disclosure that a prepolymer comprising aromatic diisocyanates can be reacted with a diol chain extender to yield an elastomer having improved mechanical properties actually teaches away from the use of forming a reaction product comprising a prepolymer comprising nonaromatic diisocyanates to yield an elastomer having excellent mechanical properties. Given the foregoing, Applicants respectfully request that the Patent Office withdraw its rejection of Claims 1-11 under 35 U.S.C. § 103(a) in view of Yokelson et al.

CONCLUSION

For the foregoing reasons, Applicants respectfully request: that the rejection of Claims 1-11 under 35 U.S.C. § 112, first paragraph, be withdrawn; that the rejection of Claims 3 and 10 under 35 U.S.C. § 112, second paragraph, be withdrawn; that the provisional rejection of Claims 1-11 under the doctrine of obviousness-type double patenting in view of the '166 patent, be withdrawn; that the provisional rejection of Claims 1-11 under the doctrine of obviousness-type double patenting in view of the '659 Application be withdrawn; that the rejection of Claims

1-11 under 35 U.S.C. § 102(b) in view of Yokelson et al. be withdrawn; that the rejection of Claims 1-11 under 35 U.S.C. § 103(a) in view of Yokelson et al. be withdrawn; and that pending Claims 1-11 be allowed to issue as a U.S. patent.

Respectfully submitted,

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VERSIONS WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS: (Marked-Up)

1. (Once Amended, Marked-Up) A light stable hydrophobic polyurethane elastomer comprising the reaction product of:

A) [A]an isocyanate terminated prepolymer having an isocyanate content ranging from 4 to 12 wt.% NCO comprising the reaction product of:

i) an OH terminated homopolymer of butadiene having a molecular weight ranging from 1000 to 4000 and an OH functionality of from 1.9 to 2.1; and

ii) an aliphatic or cycloaliphatic diisocyanate[.]; and

B) [A]a diol chain extender having a molecular weight ranging from 62 to 400.

3. (Once Amended, Marked-Up) The elastomer according to Claim 1, wherein [said dihydroxyl] the OH terminated [polybutadiene] homopolymer of butadiene is represented by the formula:

$HO[CH_2\text{-}CH{=}CH(CH_2)_2\text{-}CH{=}CH\text{-}CH_2]_nCH_2\text{-}CH{=}CH\text{-}CH_2OH$,

wherein n is a number average value from about 8 to 36.

10. (Once Amended, Marked-Up) The elastomer according to Claim 1, wherein [said hydroxyl] the OH terminated homopolymer of butadiene has an OH functionality ranging from 1.95 to 2.0.